



NGGPS Team Plan Update: NOAA Testbeds and Proving Grounds

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Outline

- **Background**
 - **NGGPS TBPG Team**
 - **NOAA Testbeds and Proving Grounds (TBPG)**
- **NGGPS/TBPG Update**
 - **TBPG role in NGGPS**
 - **Priorities, Status and Plans**



NGGPS Testbeds and Proving Grounds (TBPG) Team

Member	Organization
Paula Davidson (Lead)	NWS/STI
Michael Ek & Hendrik Tolman	NWS/NCEP/EMC
David Novak	NWS/NCEP/WPC
Russell Schneider	NWS/NCEP/SPC
Jin Huang	NWS/NCEP/CPC
John Cortinas	OAR/OWAQ
Kevin Kelleher	OAR/ESRL/GSD



Current NOAA TBPG

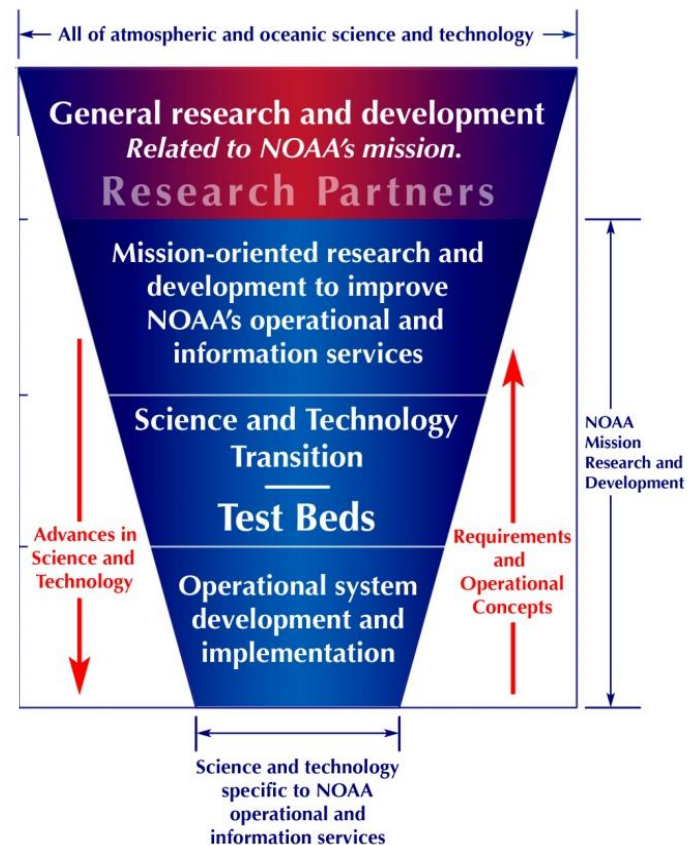


<http://www.testbeds.noaa.gov> (thanks to: Rich Latatis & Barb deLuisi)



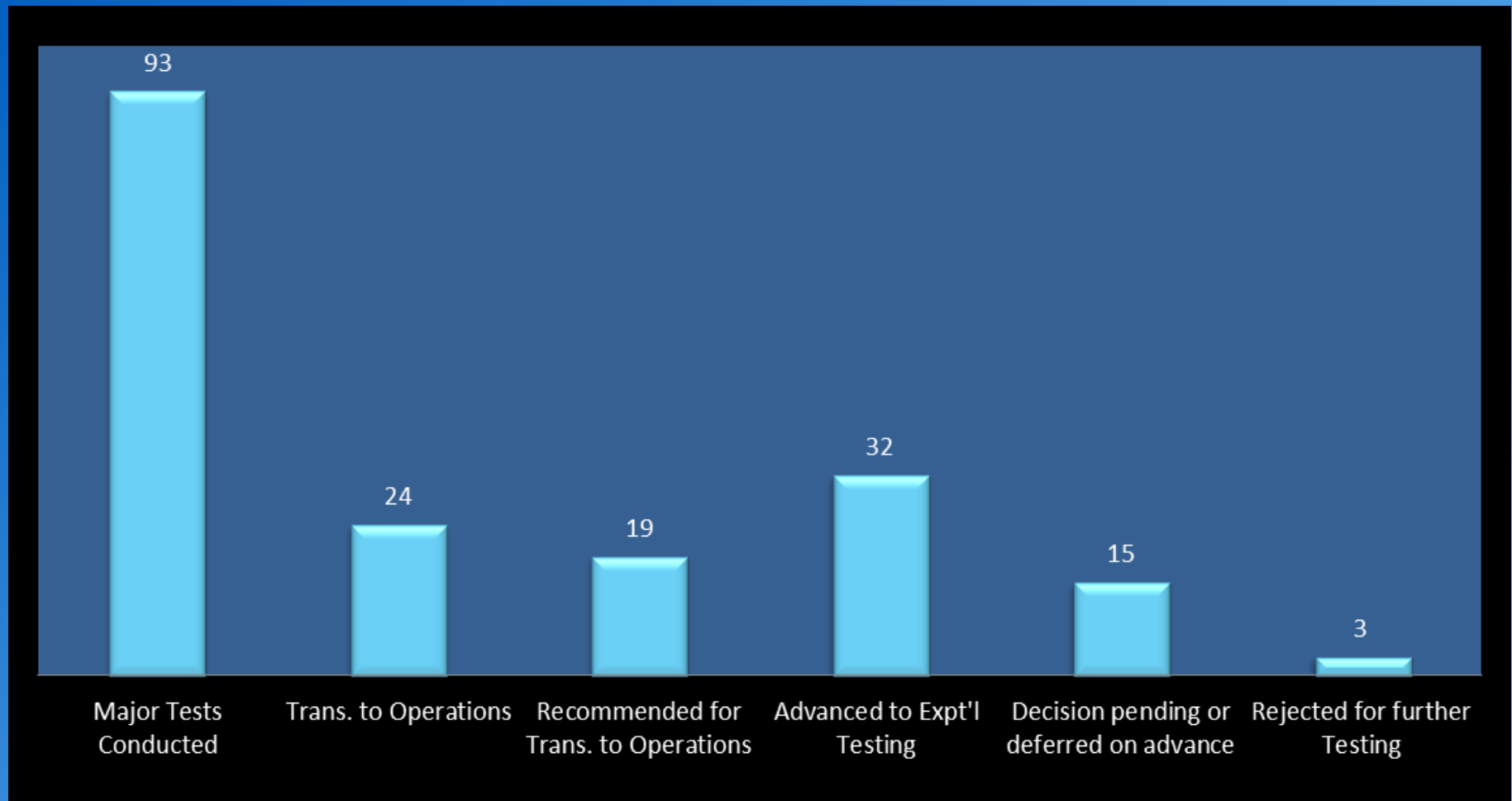
Framework for Transition: NOAA and Partners

	Phase	Key Q	Key Metric	Facility
	R&D	Does it work?	Peer-reviewed Publication	Universities, Government Labs, Private Industry
TR ➔	Developmental Testing	Works with operational systems?	Feasibility/ Engineering Analysis Successful	<u>Testbed</u> with operations-like environment
PG ➔	Experimental Testing	Meets operational performance criteria?	Go/No Go based on: Objective Performance (e.g. accuracy) Subjective Feedback Production Readiness	<u>Operational proving ground</u> for clinical tests and full "dress rehearsal"
	Operations	Maintains required performance?	Objective criteria: accuracy and reliability	Operations





NOAA TBPG Transitions in 2015: Preliminary Summary





TBPG Role in NGGPS

Conduct testing needed to exploit NGGPS advances for service improvements

- Test forecast service impacts for NGGPS prototypes, **establish skill baselines**/improvement targets – **EBS**
- Test **advanced forecaster tools/applications** needed to exploit NGGPS in achieving service improvements - **ATA**
- Facilitate phased NGGPS transition to operational readiness via testing to assess:
 - objective & subjective accuracy and reliability
 - workforce/workflow impacts
 - effectiveness for end-users



Team Priorities

- Establishing Verification Methods & Benchmark Skill (**EBS**)
- Testing Advanced Forecaster Tools and Applications (**ATA**); extracting useful, actionable information from NGGPS for decision support

Above apply to all NGGPS timescales, with TBPG initial focus on improving forecast information to address gaps in several critical service areas

- Global Scale and extended-range forecasts (Weeks 3-4 and Day 6-10)
- Storm-scale & high-resolution applications (high-impact)



Week 3-4 Forecasts

- **Current gap in explicit forecast products despite widespread user demand; NGGPS to provide basis for high-impact forecast information**
 - **Beginning baseline skill assessments in forecast guidance for significant large-scale events, e.g. hurricane, drought/floods, prolonged heat/cold**
 - **Extending object-oriented evaluation, identification of signal from noise in coupled model/ensemble guidance for reliable, consistent forecast information**
- **TBPG testing forecast service impacts for NGGPS components, coupled system prototypes and feedbacks**



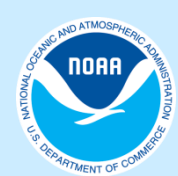
Day 6-10 Forecasts

- **Current NWS detailed forecasts only through Day 7; NGGPS advances in skill/reliability provide basis for extending to Day 10.**
 - **Rapid drop in skill for forecasts of “sensible” weather**
 - **Beginning evaluations of reliable skill in model guidance to be mined for potential useful information for decision support**
- **TBPG engaged in evaluating guidance and translation into consistent, actionable products & services**



High-impact weather forecasts (Stormscale) for US

- Current NWS forecasts for high-impact weather including tornado outbreaks, flash floods, major aviation disruptions from thunderstorms do not yet contain the temporal and spatial detail needed to support optimal decision making; NGGPS to provide framework
 - Lack of operational guidance from convection-allowing ensembles at high spatial/temporal resolutions
 - Beginning to ingest high-resolution, rapidly updating observations from radar; satellites next
- TBPG engaged in evaluating guidance and translation into consistent, actionable products & services



Round I Sponsored Projects: Testbeds-related activities

Global-scale and extended-range weather applications (Days 6-10 and Weeks 3-4)

- Exploitation of Ensemble Prediction System Information in support of Atlantic Tropical Cyclogenesis Prediction (Thorncroft) **EBS, ATA**
- Application of a Hybrid Dynamical-Statistical Model for Week 3-4 Forecast of Atlantic/Pacific Tropical Storm and Hurricane Activities (Schemm) **ATA**
- An Investigation of the Skill of Week Two Extreme Temperature and Precipitation Forecasts at NCEP-WPC (Bosart) **EBS**
- Validation of Significant Weather Features and Processes in Operational Models Using a Cyclone Relative Approach (Colle) **EBS**

Storm-Scale and High-Resolution Applications

- Test and Evaluation of Rapid Post-Processing and Information Extraction from Large Convection 3hr Tornado Outlooks (Correia) **ATA**
- Data Mining of High-resolution Storm-scale Data Sets (Smith) **ATA**
- Information Extraction and Verification of Numerical Weather Prediction for Severe Weather Forecasting (Jirak) **EBS, ATA**
- Improvement of Convective/Severe Weather Prediction through an Integrative Analysis of WRF Simulations and NEXRAD/GOES Observations over the CONUS (Dong) **EBS**

Cross-cutting

- Incorporation of near real-time Suomi NPP Green Vegetation Fraction and Land Surface Temp data into the NCEP Land modeling suite (Csiszar) **ATA, EBS**



Sponsored Projects and Partners

Focus Area	Projects	Principal TB Partners
Week 3-4	Global-scale and extended range weather Thorncroft, Schemm, Csiszar)	Thorncroft: JHT (also EMC) Schemm: CTB Csiszar: JCSDA (EMC, NESDIS/STAR)
Day 6-10	Extended range weather (Thorncroft, Bosart, Colle, Csiszar)	Bosart: HMT (also EMC) Colle: HMT (also EMC)
Day 0-3 high impact weather	Storm-scale and high-resolution applications (Correia, Smith, Jirak, Dong, Csiszar)	Correia: HWT Smith: HWT Jirak: HWT (also EMC) Dong: HWT



Sponsored Projects Milestones Status (10/31/15)

- First 3 of > 100 planned milestones to be completed Q2 Year1.

Project	TB	Lead	Q2 Year 1 Milestones		Status 10/31/15
Incorporation of near real-time Suomi NPP Green Vegetation Fraction and Land Surface Temp data into the NCEP Land modeling suite	JCSDA	Csiszar (NESDIS/STAR)	1.3	9/30/15. Develop software application to ingest GVF datasets (AVHRR and VIIRS), perform statistical analyses and implement data display tools.	In progress. GRIB2 conversion complete.
Exploitation of Ensemble Prediction System Information in support of Atlantic Tropical Cyclogenesis Prediction	JHT	Thorncroft (SUNY/Alb)	1.1	11/1/15. Provide quantitative assessment of model skill in prediction of tropical cyclogenesis associated with AEWs, as a function of region and lead time and for both the GFS and ECMWF ensemble prediction systems.	In progress. Metrics established
Application of a Hybrid Dynamical-Statistical Model for Week 3-4 Forecast of Atlantic/Pacific Tropical Storm and Hurricane Activities	CTB	Schemm (NCEP)	1.1	10/31/15 Complete Statistical analysis of the NOAA Hurricane Best Track Dataset and the daily CFSv2 Reanalysis data over the 1999-2014 period, and the 45-day CFSv2 reforecasts (1999–2010) and the 45-day CFSv2 real-time forecasts (2011–2014).	Completed



FY16 Status: Project Highlights, TBPG Priority and Issue

- Accomplishments: Highlights from projects underway
 - Early results show predictability for TC at week 3-4 in hybrid statistical-dynamical models (Schemm)
 - Case studies indicate critical precursors for predicting extreme T, precip events in weeks 1-2 include extratropical transitions and cyclogenesis events and associated impacts on flow patterns (Bosart)
- FY16 TBPG Priority
 - Continuing evaluation of potential high-impact service improvements extracted from NGGPS
- Issue: ensuring effective coordination with external partners and NOAA testbeds
 - Planning for site visits during collaborative testing



Progress, Status and Plans: Programmatic

- High-level testing criteria and performance targets, identifying critical gaps in metrics developed for use in plans and Round I R2O FFO. Q4 FY14. Completed
- Testbeds-related projects:
 - Round I FFO Projects: started 1May 2015; 1st project reports 30Nov, 2015
 - Enhanced support for testbed infrastructure/personnel for robust involvement of NOAA forecast expertise. Q2 FY15. Completed.
 - Round II FFO Projects: FFO issued Dec 2015. LOIs were due 19 Jan 2016 for full proposals due 29Feb 2016. Awards anticipated by Sept 2016.
- Refinement of the testing infrastructure and testing approach. Completed Q4 FY15. Plans for evolved DTC progressing; TOO for Global Modeling component developed.



Longer-Range Plans

- Increasing partnerships with related NOAA activities
- Expand testing activities to include additional NWS service areas impacted by NGGPS
- Expand involvement to include OPG in assessing service impacts (WFOs/RFCs)
- Refine and test impact-based performance targets for critical NWS service areas; address gaps in decision support services
- Continuing phased testing of advanced forecaster tools and applications: rigorous and conclusive evaluation of accuracy, reliability, utility and services impacts in providing actionable decision support



Backup



TBPG Testing Coordination for NGGPS

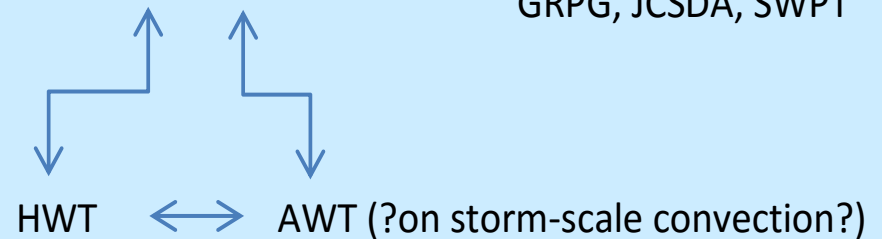
1. CODE testing:

Global components

DTC (new role)

potentially TBA: COMT, CTB,
GRPG, JCSDA, SWPT

2. Regional & Storm-scale components:



Forecaster and service impacts (including Post-processing and forecaster apps):

Service centers

JHT HMT/WPC HWT AWT



Local offices

OPG (for WFOs, RFCs)



Related NGGPS Efforts

- **NOAA TBPG facilitate testing of NOAA pre-operational service improvements: reaching out to partners across NGGPS teams**
- **Cross-cutting efforts in progress to improve land surface modules for NGGPS through assimilation of new satellite surface observations (Csizar project)**
- **TBPG efforts to increase NGGPS collaboration will focus first on NGGPS teams for evaluation methodology (Stajner, lead), expanding to NGGPS teams developing other forecast tools (post-processing; Hamill, lead)**



Related NOAA efforts

- **Leveraging established procedures and coordination among NOAA TBPG**
- **Ongoing coordination with USWRP-sponsored efforts**
- **Working with nascent Arctic Testing activity to establish as NOAA Testbed/Proving Ground**
- **Working with NOAA-wide efforts led by NOAA's Chief Scientist to accelerate transition**



Annual TBPG Workshops

- Highlight/promote integrated testing opportunities in NOAA TB/PG
- Overviews from current/emerging TB/PG
- Sharing best practices for rigorous transition testing
- Integrating Science Themes and Best Paper Awards:
 - 3rd Annual Workshop: Intense Precipitation Events (2012)
 - 4rd Annual Workshop: High-impact Environmental Events (2013)
 - 5th Annual Workshop: Advances in Environmental Prediction (2014)
 - 6th Annual Workshop: Advances in Environmental Intelligence (2015)
 - 7th Annual Workshop: Communicating Probabilistic Intelligence/Forecasts (2016)
- Best paper (Science-theme) competition
 - Criteria - excellence, relevance, presentation



TBPG Coordinating Committee

- Comprised of TBPG managers and LOTM-designated LO focal points:
 - Chair: Paula Davidson (NWS LO focal point)
- Initial meeting (NWS and OAR members): Seattle AMS, Jan 2011
- Activities:
 - Organizes annual workshops on NOAA testbeds/proving grounds
 - Monthly virtual meetings featuring TBPG recent tests/results
 - Coordination/Outreach: website www.testbeds.noaa.gov, one-on-one tutorials on guidelines, testing protocols
 - Coordinating announcements of opportunity for testing
 - Adopted recommended approach to metrics for recognizing progress, Fall 2012:
 - Relevance, quality, and effectiveness/efficiency
 - Accomplishments and performance metrics provided in annual TBPG progress reports
 - Summary publication (Ralph, Intrieri, et al.): *The emergence of weather-focused testbeds linking research and forecasting operations*. BAMS, 94, 1187-1210, 2013